



承 认 书

SPECIFICATION FOR APPROVAL

客户名称 Customer Name	德业		
客户项目名 Customer Project Name	美版三相电表	盛邦尔料号 Surbaner P/N	160180-01838
客户编码 Customer P/N	30221700000121	工作频段 Working Band	910-927MHz
产品描述 Product description	LORA 天线/SMA 直公头公针/PCB		
版本号 Version	V01		
设计人信息/Designer Information			
射频工程师 RF Engineer	林德友	研发主管 R&D Diretor	周洪亮
结构工程师 ME Engineer	张宇龙		

盛邦尔审批/Surbaner Approval				客户批准/Customer Approval	
	制作 Prepared By	审核 Checked By	批准 Approval By	审核 Checked By	批准 Approval By
签章 Signature	王海华林				
日期 Date	2025. 11. 13				

修订履历/Change Log				
版本 Version	修订内容 Change Description	责任人 Person in Charge	核准 Approval By	日期 Date
V01	增加频点参数	林德友	周洪亮	2025. 11. 13

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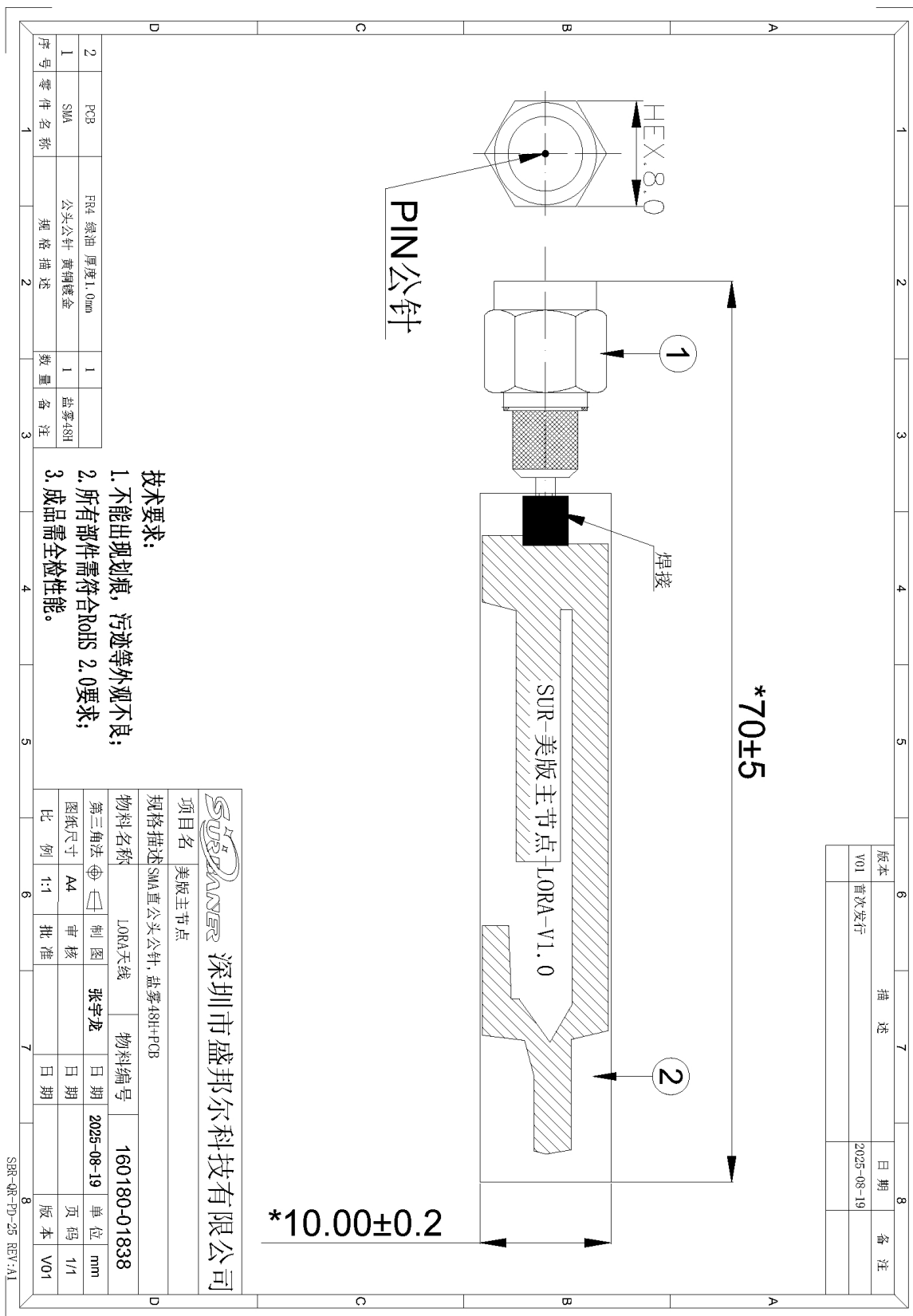
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一. 产品图纸或实物图片/Drawing or Product Image



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二. Technical Parameter /技术参数

1. Antenna/天线		
No/序号	Part Name/项目	SPEC/规格
1	Frequency Range/ 频率范围	910-927MHz
2	Impendence/阻抗	50 ohm nominal
3	Gain/增益	$\geq -1.0\text{dBi}$
4	Polarization/极化	LINE
5	VSWR/驻波比	< 2.0
6	Efficiency/效率	$\geq 30\%$ AVG
7	RF Cable/射频连接线	/
8	RF Connector/连接器	SMA 直公头公针
2. Environmental Characteristics/环境特性		
No/序号	Part Name/项目	SPEC/规格
1	Operation Humidity /工作湿度	5~95%不冷凝
2	Operating Temperature /工作温度	$-30 \sim +70^{\circ}\text{C}$
3	Store Temperatuer /工作储存温度	$-40 \sim +80^{\circ}\text{C}$
4	Salt Spray Test /盐雾试验	48H

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射频性能测量报告

RF Performance Test Report

客户名称 Customer Name	德业	项目名称 Project Name	美版主节点	盛邦尔料号 Surbaner P/N	160180-01838
频段 Band	910-927MHz	测试日期 Test Date	2025/11/12	测试人 Inspector	林德友

天线测试设备简介

Antenna Test Equipment Introduction

测试天线输入特性使用 Agilent E5071C and Agilent 5062A 矢量网络分析仪；辐射特性利用 Satimo 三维近场暗室进行测试，并分别使用 8960 E5515 和 Agilent E4438C 进行了分析。暗房的测试坐标如下：

Test of antenna input characteristics using Agilent E5071C and Agilent 5062A vector network analyzer; The radiation pattern of the antenna are tested using the Satimo starlab 3D near field Anechoic Chamber, and the instrument is used to agilent8960 E5515 and Agilent E4438C. The test coordinates of the darkroom are as follows:

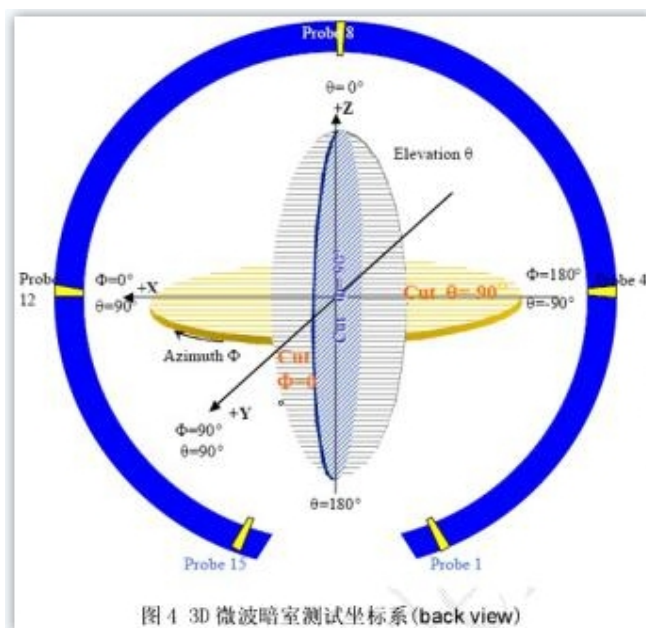


图4 3D 微波暗室测试坐标系(back view)

1. S11 参数测量/S11 Parameter-VSWR

使用一根 50Ω 同轴电缆连接到天线，然后该电缆连接到网络分析仪测量 S11 参数，被测量产品远离金属至少 20 厘米。

Measuring Method is a 50Ωcoaxial cable is connected to the antenna. Then this cable is connected to a network analyzer to measure the S11 parameter, Keeping this fixture away from metal at least 20cm.

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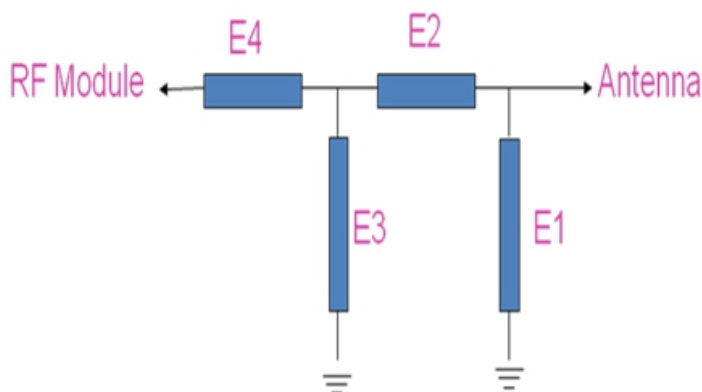
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Test System

Sequence Number	Test Item	equipment
S parameter	VSWR	Agilent 5071C & Agilent 5062A
OTA Test	TRP&TIS	Agilent 8960 E5515C& Agilent 4438C&CMW500 &CMW270 ETS&SATIMO
Gain & Efficiency	Gain & Efficiency	ETS&SATIMO Agilent 5071C



Antenna Matching Network



Element	Capacitor	Inductor
E1	N/A	N/A
E2	N/A	N/A
E3	N/A	N/A
E4	N/A	N/A

PCB 板端原始匹配未改动

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S11 Parameter-S11



Frequency	915
VSWR	1.48

Gain & Efficiency

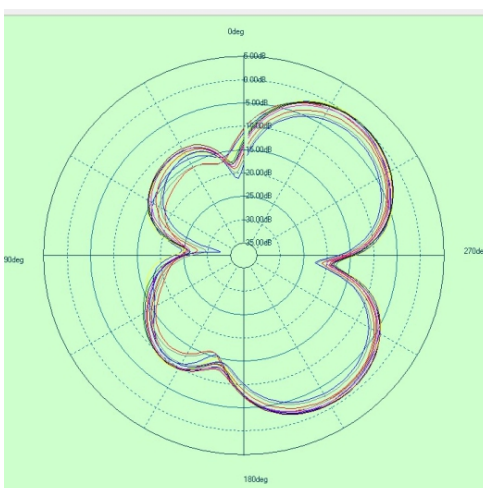
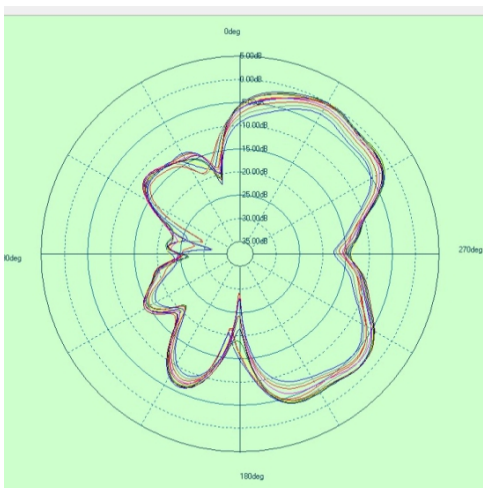
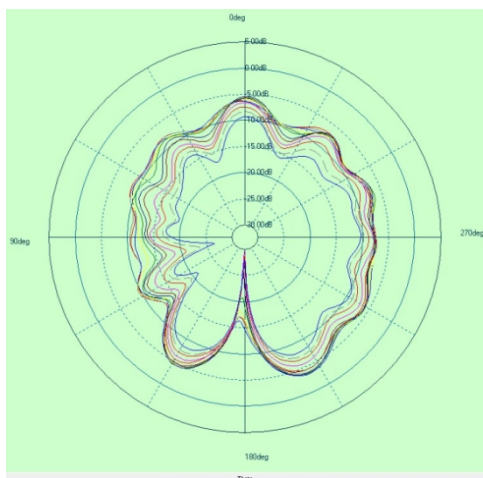
Frequency	Efficiency	E Total.
910	34.2%	-0.27
911	34.1%	-0.22
912	33.5%	-0.25
913	32.5%	-0.32
914	31.6%	-0.39
915	31.0%	-0.45
916	30.9%	-0.48
917	31.2%	-0.47
918	31.9%	-0.44
919	32.7%	-0.38
920	33.3%	-0.31
921	33.4%	-0.30
922	32.9%	-0.32
923	31.9%	-0.39
924	30.9%	-0.51
925	30.1%	-0.63
926	29.8%	-0.72
927	30.1%	-0.75

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2D Pattern



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样品尺寸测量报告

Sample Dimensions Test Report

客户名称 Customer Name	德业	客户料号 Customer P/N	3022170000012 1	盛邦尔料号 Surbaner P/N	160180-01838
测试日期 Test Date	2025/09/05	样品数量 Sample Qty.	3	测试人 Inspector	曾心荣
尺寸编号 Dimension No.	标准 Standard	样品 1 Sample 1	样品 2 Sample 2	样品 3 Sample 3	Pass/NG
①尺寸 1	10.00±0.2mm	10.05	10.00	9.97	Pass
②尺寸 2	70.00±5mm	71.00	70.00	68.50	Pass
③					
④					
⑤					
⑥					
⑦					
最终结论 Conclusion					PASS
测试人&日期 Inspector & Date	曾心荣 2025/09/05		批准&日期 Approval & Date		

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可靠性测试报告

Reliability Test Report

客户名称 Customer Name	德业	客户料号 Customer P/N	30221700 000121	盛邦尔料号 Surbaner P/N	160180-01840	
测试日期 Test Date	2025/09/05	样品数量 Sample Qty.	3	测试人 Inspector	何春辉	
测试项目 Test Item	要求 Requirement	试验设备 testing equipment	样品 1 Sample 1	样品 2 Sample 2	样品 3 Sample 3	判定 PASS/NG
高温存储	在+80℃条件下暴露 24H, 恢复 2H 后进行测试电气性能正常	恒温恒湿箱	OK	OK	OK	Pass
低温存储	在-40℃条件下暴露 24H, 恢复 2H 后进行测试电气性能正常	恒温恒湿箱	OK	OK	OK	Pass
高温高湿存储	将测试样件天线置于环境温度: 60±3℃, 相对湿度: 90%的场所; 试验时间: 48 小时, 随后在标准试验环境下放置 2 小时	恒温恒湿箱	OK	OK	OK	Pass
连接器盐雾试验	(5 ± 0. 5) %氯化钠、pH 值为 6. 5~7. 2, 实验箱温度 (35±2) °C ☐ 24H ☒ 48H	盐雾试验机	OK	OK	OK	Pass
连接器铆压拉拔力	RG174 线径 ≥60N	推拉力计	≥60N	≥60N	≥60N	Pass
最终结论 Conclusion						Pass
测试人&日期 Inspector & Date	何春辉 2025/09/05		批准&日期 Approval & Date			

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